The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

EARTH SCIENCE

PROGRAM MODIFICATION EDITION

Thursday, June 15, 2000 — 9:15 a.m. to 12:15 p.m., only

The answer paper is stapled in the center of this examination booklet. Open the examination booklet, carefully remove the answer paper, and close the examination booklet. Then fill in the heading of your answer paper.

All of your answers are to be recorded on the separate answer paper. For each question in Part I and Part II, decide which of the choices given is the best answer. Then on the answer paper, in the row of numbers for that question, circle with pencil the number of the choice that you have selected. The sample below is an example of the first step in recording your answers.

SAMPLE: (1) 2 3 4

If you wish to change an answer, erase your first penciled circle and then circle with pencil the number of the answer you want. After you have completed all three parts of the examination and you have decided that all of the circled answers represent your best judgment, signal a proctor and turn in all examination material except your answer paper. Then and only then, place an X in ink in each penciled circle. Be sure to mark only one answer with an X in ink for each question. No credit will be given for any question with two or more X's marked. The sample below indicates how your final choice should be marked with an X in ink.

SAMPLE: (X) 2 3 4

For questions in Part III, record your answers in accordance with the directions given in the examination booklet.

The *Earth Science Reference Tables*, which you may need to answer some questions in this examination, are supplied separately. Be certain you have a copy of the 1994 edition of these reference tables before you begin the examination.

When you have completed the examination, you must sign the statement printed at the end of the answer paper, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer paper cannot be accepted if you fail to sign this declaration.

DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.

Part I

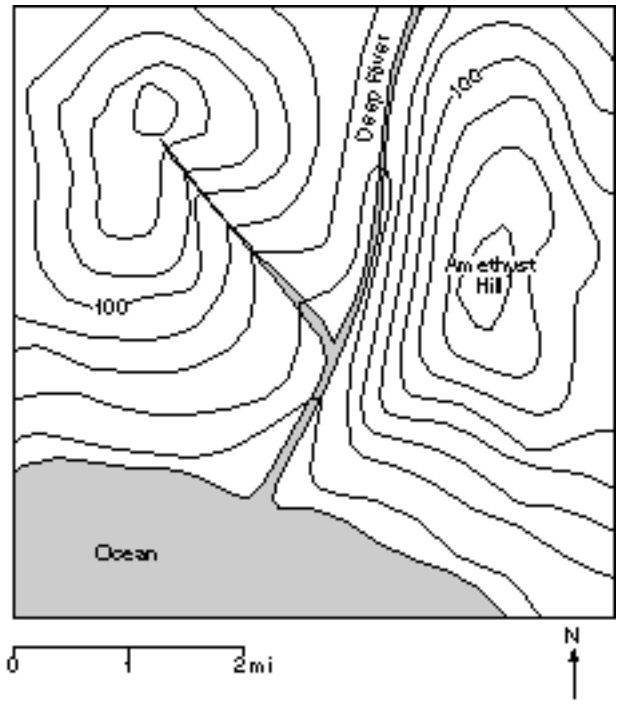
Answer all 40 questions in this part.

Directions (1–40): For *each* statement or question, select the word or expression that, of those given, best completes the statement or answers the question. Record your answer on the separate answer paper in accordance with the directions on the front page of this booklet. Some questions may require the use of the *Earth Science Reference Tables*. [40]

1 Measurements of gravity are greater at the poles than at the Equator. This evidence best supports the inference that Earth has a

1 perfectly spherical shape
2 slightly oblate shape
3 very elliptical orbit
4 slightly elliptical orbit

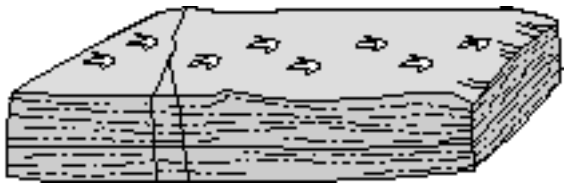
2 A contour map is shown below. Elevations are shown in feet.



Which side of Amethyst Hill has the steepest slope?

1 north
2 south
3 east
4 west

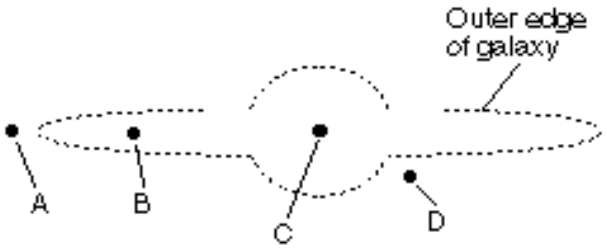
3 The diagram below represents a rock sample containing fossilized *Coelophysis* footprints. The sample was found in New York State.



According to current knowledge of New York State fossils, during which geologic time period were these footprints most probably made?

1 Cambrian
2 Devonian
3 Tertiary
4 Triassic

4 The diagram below represents a side view of the Milky Way Galaxy.

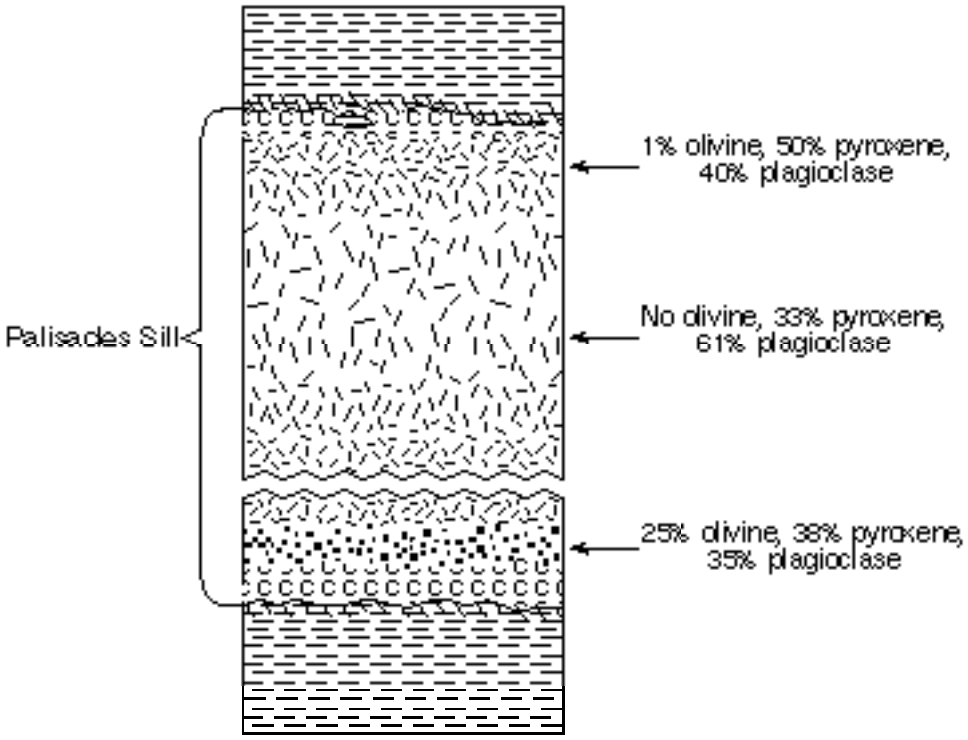


(Not drawn to scale)

At approximately which position is Earth's solar system located?

(1) *A*
(2) *B*
(3) *C*
(4) *D*

5 The geologic cross section below shows variations of mineral composition that can be observed in the Palisades Sill in southeastern New York State. The Palisades Sill is an intrusive igneous rock called diabase.



Which other igneous rock is closest to diabase in mineral composition?

1 andesite
2 granite
3 rhyolite
4 gabbro

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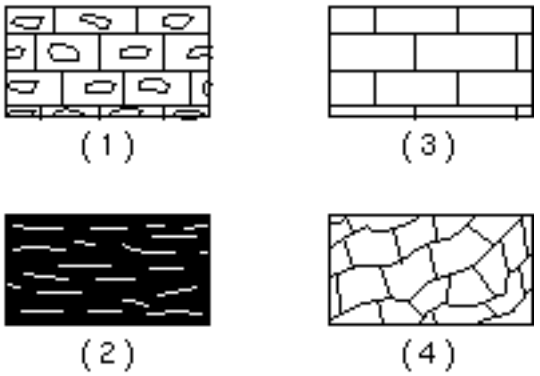
6 What is the direct cause of most earthquakes?

1 movement of bedrock along a fault line
2 gravitational pull on bedrock by the Moon
3 deposition of sediment in lakes and oceans
4 heat exchange between the crust and the atmosphere

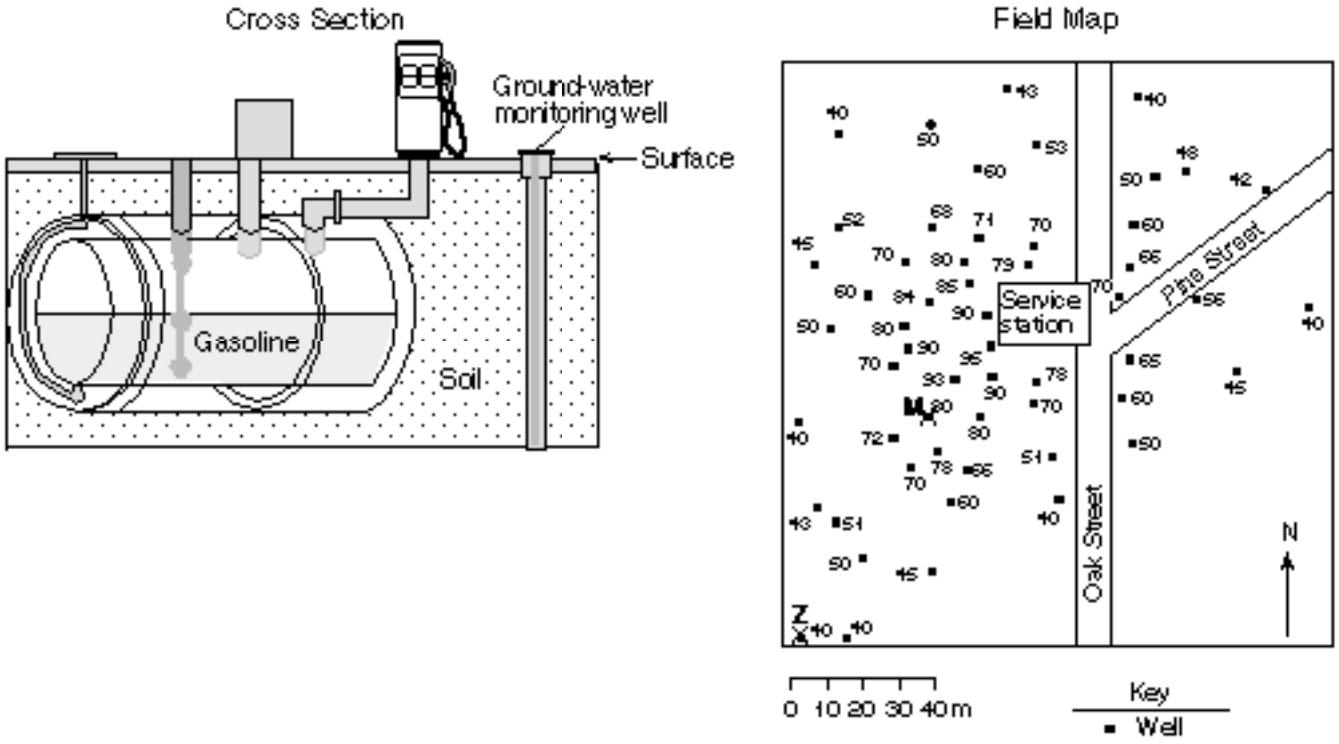
7 Adding automobile exhaust gases to the atmosphere has had the greatest impact on landscape development by

1 changing the position of crustal plates
2 changing Earth's prevailing wind patterns
3 increasing the rate of chemical weathering
4 increasing the amount of ozone in ground water

8 Which map symbol is used in the *Earth Science Reference Tables* to represent an organically formed sedimentary rock composed mostly of carbon?



Base your answers to questions 9 through 11 on the diagram and field map below. The diagram shows an underground gasoline storage tank at a service station that is leaking gasoline into the soil. Ground-water monitoring wells were drilled to show the pattern of the leakage. The concentration of gasoline, in parts per million, at each well is indicated on the field map.



9 Which expression shows the approximate gradient (rate of change in gasoline concentration per meter) from point *M* to point *Z*?

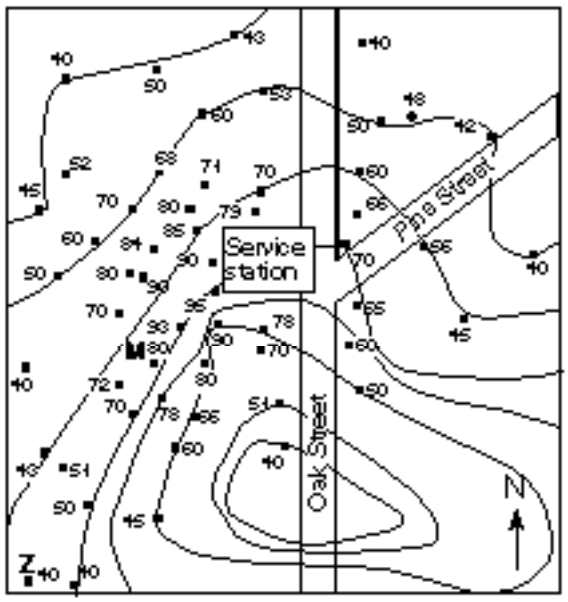
1 gradient = $\frac{(80 \text{ ppm} - 40 \text{ ppm})}{70 \text{ meters}}$

2 gradient = $\frac{70 \text{ meters}}{(80 \text{ ppm} - 40 \text{ ppm})}$

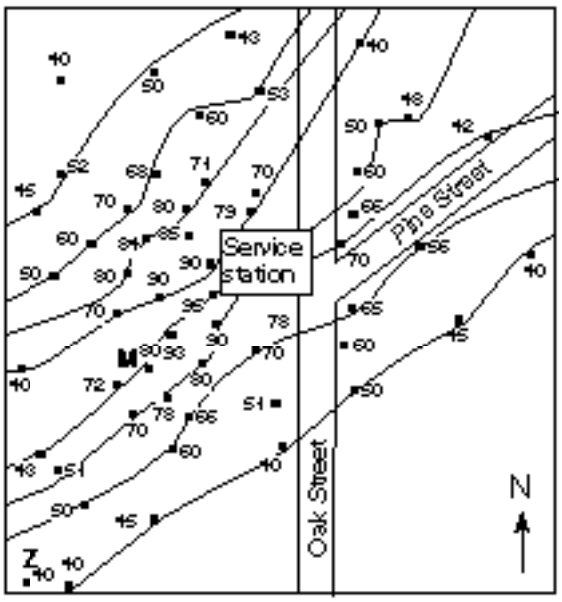
3 gradient = $\frac{(80 \text{ ppm} - 70 \text{ ppm})}{40 \text{ meters}}$

4 gradient = $\frac{40 \text{ meters}}{(80 \text{ ppm} - 70 \text{ ppm})}$

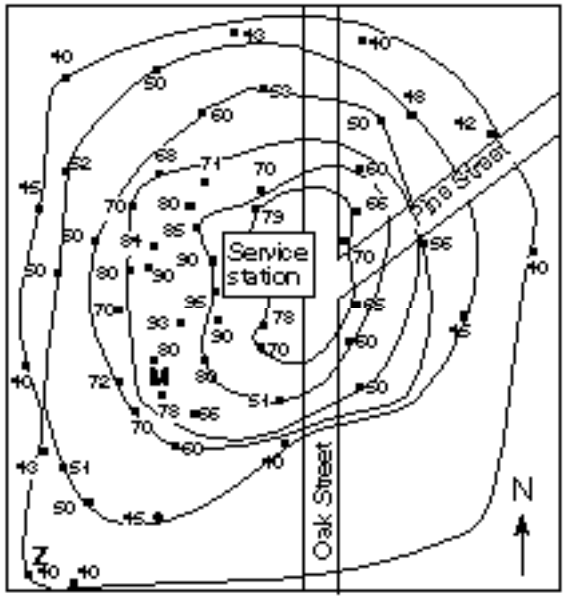
10 Which isoline map best represents the pattern of gasoline concentration as measured in the wells?



(1)



(3)



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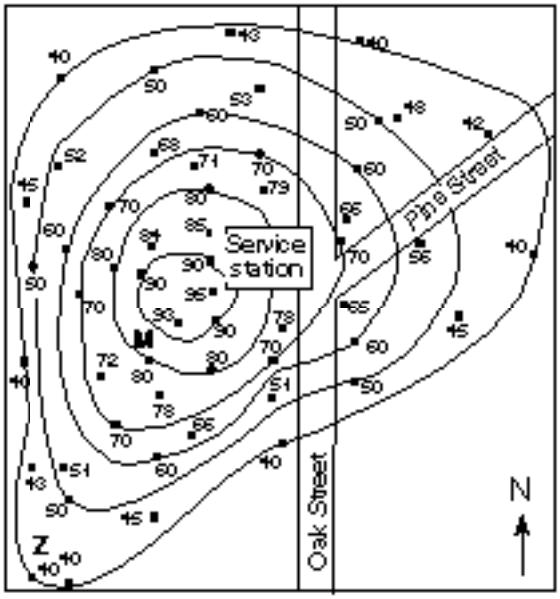
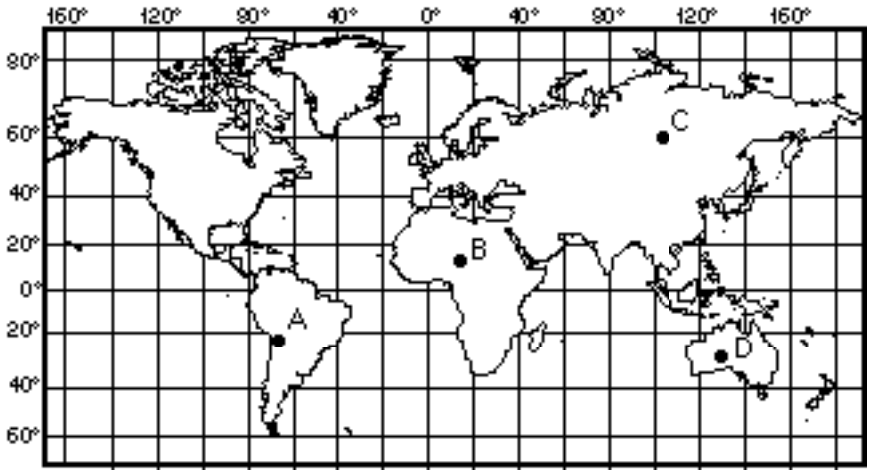


(4)

11 Which statement best describes the pollution field's size and concentration measurement if the gasoline continues to leak out of the tank?

1 The size of the pollution field will decrease, and the concentration measurement will decrease.
2 The size of the pollution field will decrease, and the concentration measurement will increase.
3 The size of the pollution field will increase, and the concentration measurement will decrease.
4 The size of the pollution field will increase, and the concentration measurement will increase.

12 Letters *A* through *D* shown on the map below are locations on Earth's surface.



Which location is closest to a major zone of frequent earthquakes and volcanic activities?

(1) *A*
(2) *B*
(3) *C*
(4) *D*

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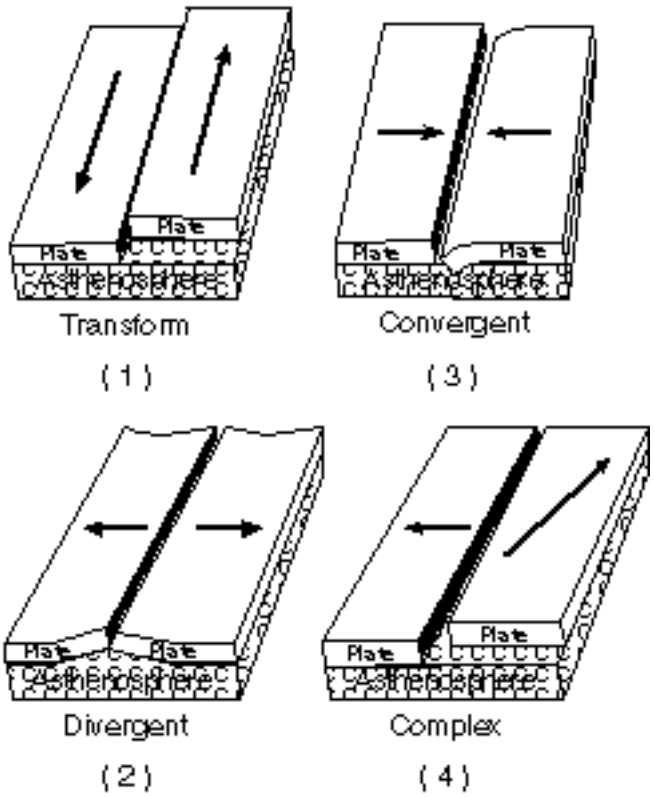
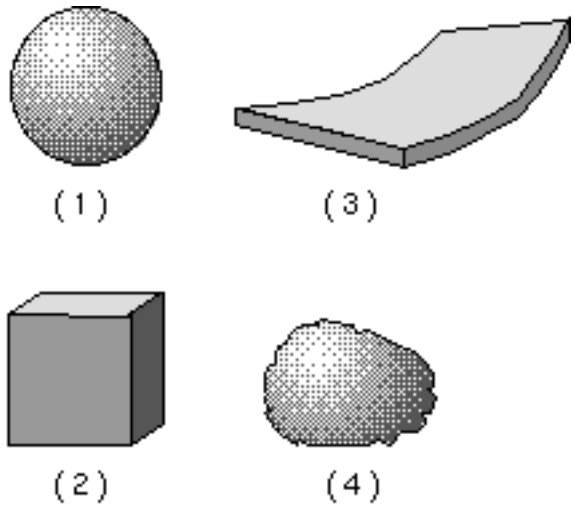
13 Which diagram best shows the type of plate boundary found between the China Plate and the Philippine Plate?



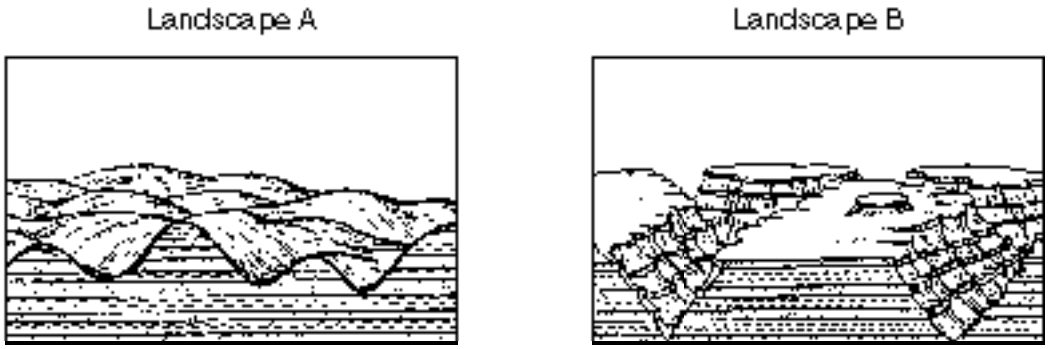
14 In a region that is being uplifted faster than it is being eroded, hills usually have

1 steep slopes and slow-moving streams
2 steep slopes and fast-moving streams
3 gentle slopes and slow-moving streams
4 gentle slopes and fast-moving streams

15 The four objects below are made of the same material and have the same mass. Which object will settle fastest in calm water?



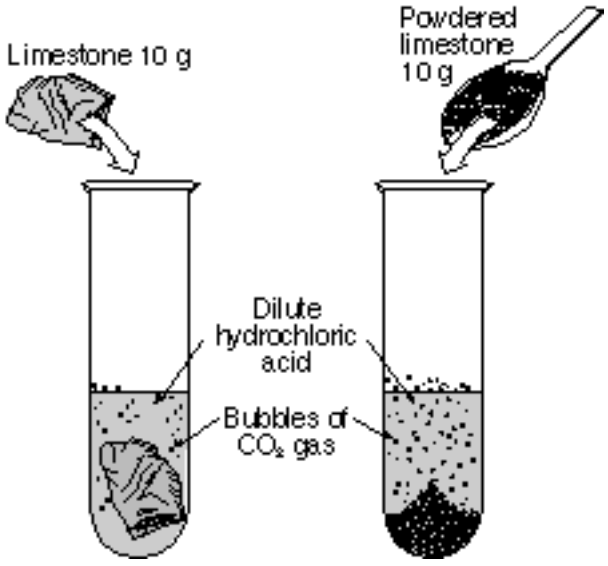
16 The diagram below shows two landscape regions with similar bedrock type and structure.



Which statement best explains why these two landscape regions are different in appearance?

1 Landscape *A* formed in a dry region, and landscape *B* formed in a humid region.
2 Landscape *A* formed in a dry region, and landscape *B* formed in a glaciated region.
3 Landscape *A* formed in a humid region, and landscape *B* formed in a dry region.
4 Landscape *A* formed in a humid region, and landscape *B* formed in a glaciated region.

17 The demonstration shown in the diagram below indicates that powdered limestone reacts faster than a single large piece of limestone of equal mass when both are placed in acid.



The most likely reason powdered limestone reacts faster is that it has

1 less total volume
2 more chemical bonds
3 more total surface area
4 lower density

18 Which process could be indicated by the expression below?

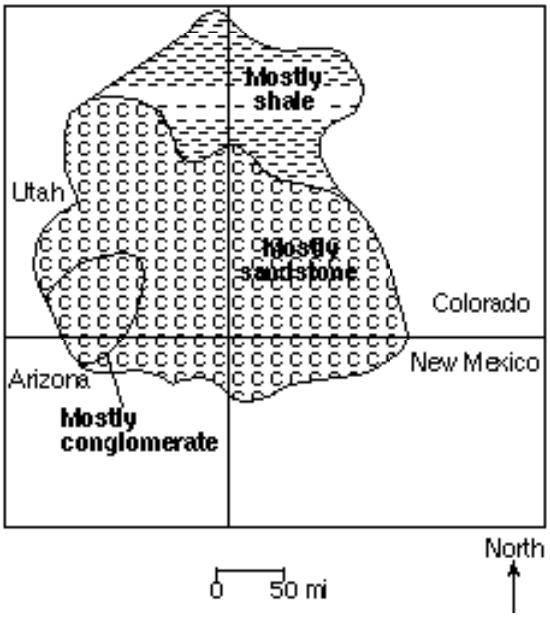
$$U^{238} \text{ Æ } Pb^{206}$$

1 crystallization of minerals in basalt
2 chemical weathering of marble
3 radioactive decay in granite
4 ozone depletion in the atmosphere

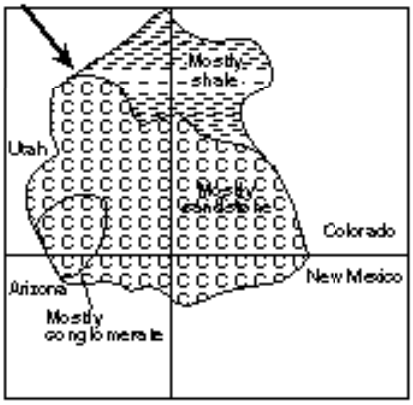
19 Which major mountain-building episode is most recent?

1 Grenville orogeny
2 Taconian orogeny
3 Acadian orogeny
4 Appalachian orogeny

20 The map below shows the surface bedrock in an area of the southwestern United States that formed from sediments deposited in a shallow sea that formerly existed in that area. These sediments were transported by a river that flowed into the sea.

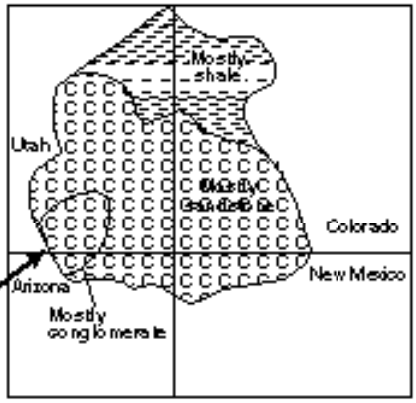


In which diagram does the arrow best show the direction of flow of the river that deposited these sediments and the point at which the river emptied into the sea?

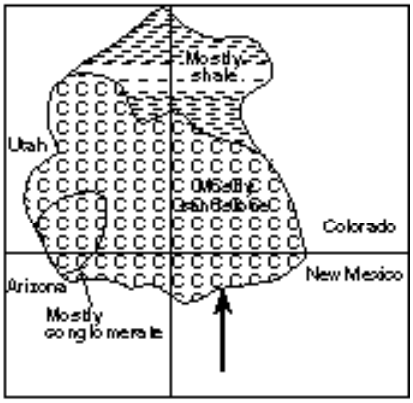


(1)

(3)

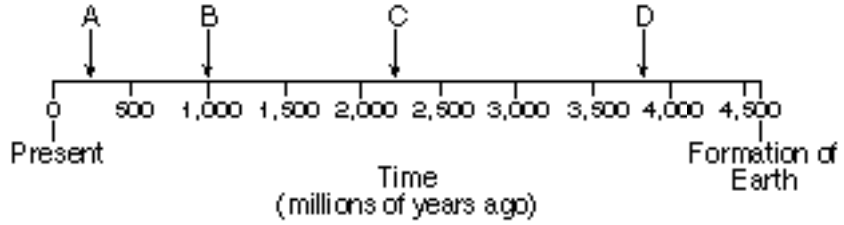


(2)



(4)

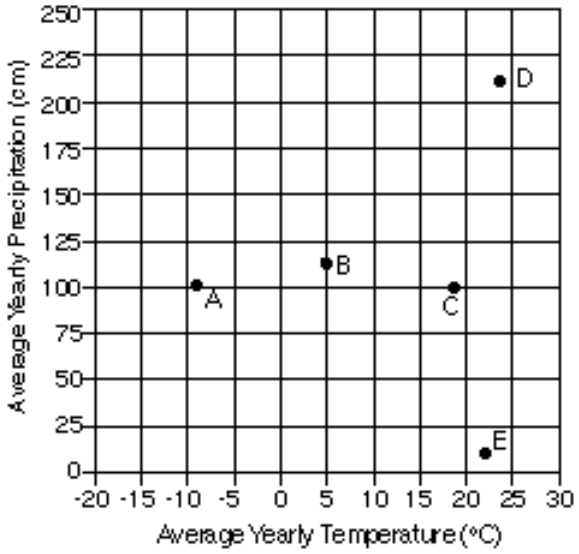
21 The time line below represents the geologic history of Earth. Letters *A*, *B*, *C*, and *D* represent specific times in Earth's history.



Which letter best indicates when trilobites became extinct?

(1) *A*
(2) *B*
(3) *C*
(4) *D*

Base your answers to questions 22 and 23 on the graph below, which shows the average yearly temperature and average yearly precipitation for Earth locations *A* through *E*.



22 The climate indicated at location *E* on the graph would most likely be classified as

1 cold and dry
2 cold and humid
3 warm and dry
4 warm and humid

23 Which location has the climatic conditions necessary for the greatest amount of chemical weathering to occur?

(1) *A*
(2) *B*
(3) *C*
(4) *D*

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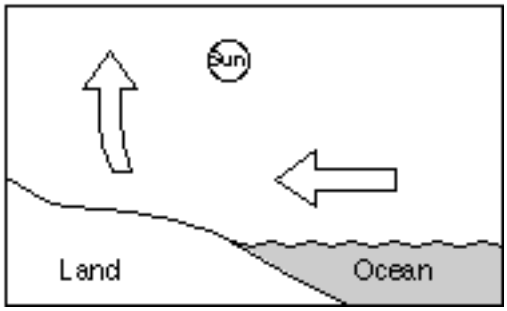
24 Which type of air mass would most likely have low humidity and high air temperature?

(1) cT
(2) cP
(3) mT
(4) mP

25 In the diagram below, arrows represent air movement near an ocean coastline on a summer afternoon.



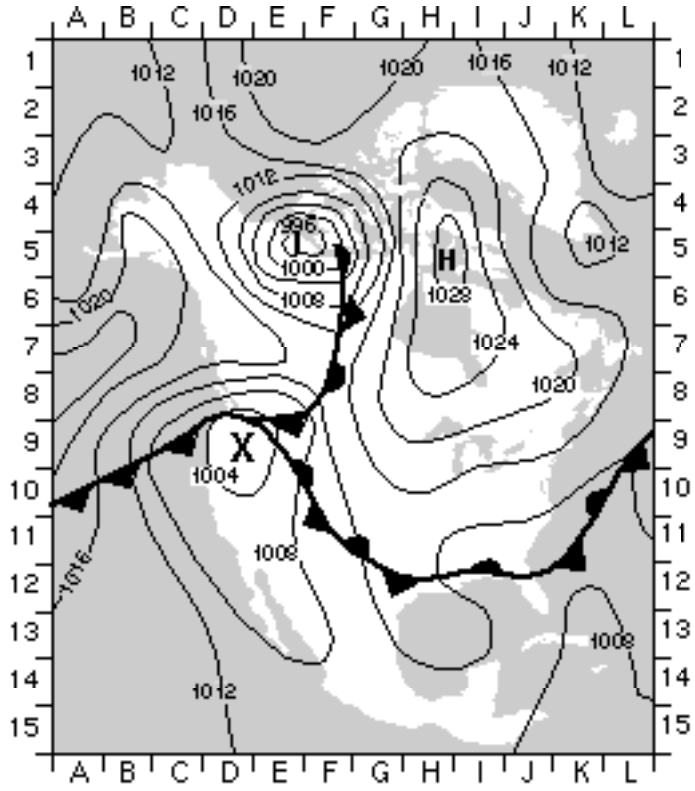
Compared to the air over the ocean, the air over the land has a

1 lower temperature and lower barometric pressure
2 lower temperature and higher barometric pressure
3 higher temperature and lower barometric pressure
4 higher temperature and higher barometric pressure

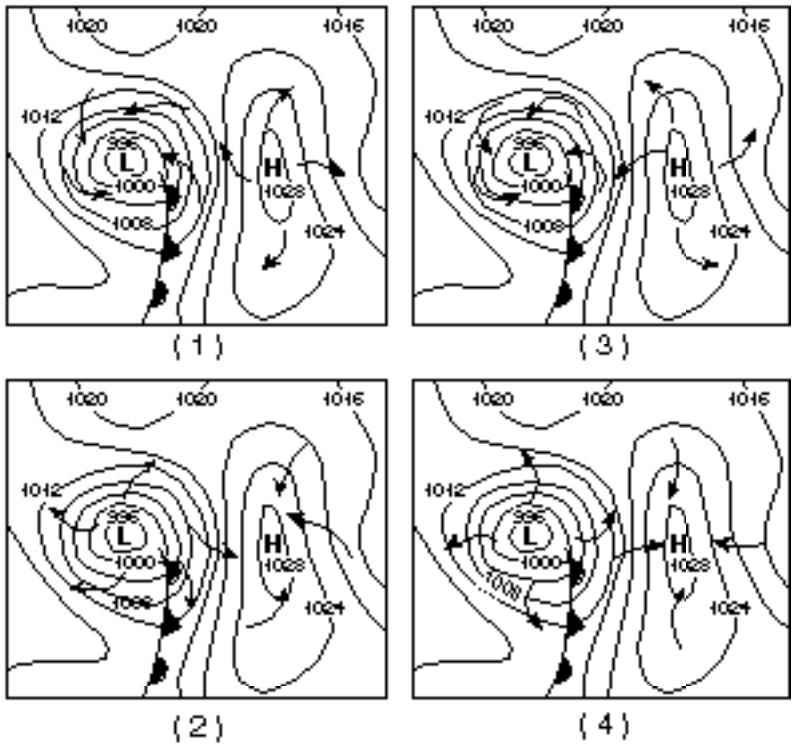
26 Which ocean current cools the climate of some locations along the western coastline of North America?

1 Florida Current
2 California Current
3 Canaries Current
4 Alaska Current

Base your answers to questions 27 through 29 on the weather map of North America below. A grid system of letters and numbers is provided along the edges of the map to assist in finding locations. Isobars are labeled in millibars. Letter *X* represents the center of a second low-pressure system.



27 On which map do the arrows correctly show the surface wind pattern for the high- and low-pressure centers shown on the northern part of the weather map of North America?



28 If the low-pressure center labeled *X* follows a typical storm track from its present location, the low-pressure center will move generally toward the

1 north
2 south
3 east
4 west

29 Which type of front is shown at grid coordinates *A*–10?

1 occluded
2 stationary
3 cold
4 warm

30 A student in New York State observed that the noon Sun increased in altitude each day during the first part of a certain month and then decreased in altitude each day later in the month. During which month were these observations made?

1 February
2 June
3 September
4 November

31 The data table below compares the percentage of sunlight reflected from various types of Earth surfaces.

Surface	Percent of Sunlight Reflected
Fresh snow	80–85
Old snow	50–60
Sand	20–30
Grass	20–25
Dry soil	15–25
Wet soil	10
Forest	5–10
Water (Sun at sunset)	50–80
Water (Sun overhead)	3–5
Thick cloud	70–80
Thin cloud	25–50

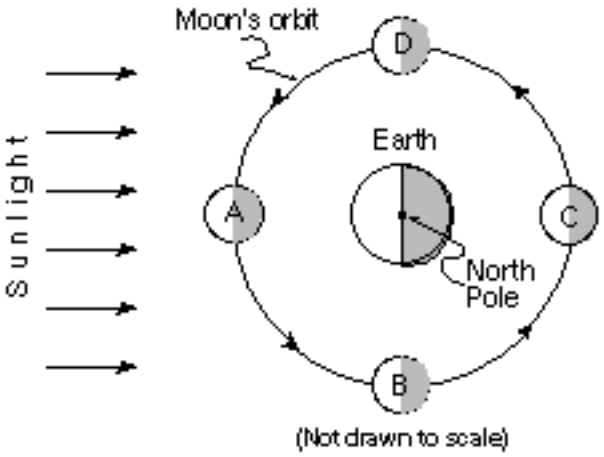
Which statement is best supported by the table?

1 Light-colored surfaces reflect more sunlight than dark-colored surfaces.
2 Rough surfaces reflect more sunlight than smooth surfaces.
3 Soil surfaces reflect more sunlight than cloud surfaces.
4 Vegetative surfaces reflect more sunlight than ice surfaces.

32 One reason Massena, New York, has a colder climate than Binghamton, New York, is that Massena

1 absorbs more rays of incoming solar radiation
2 is usually closer to the source of solar radiation
3 receives shorter wavelengths from the source of solar radiation
4 receives lower angle rays of incoming solar radiation

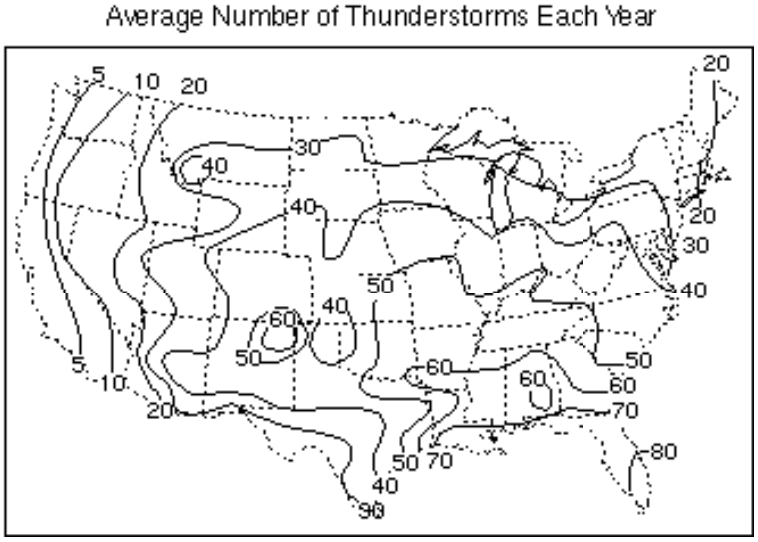
33 The diagram below shows a model of the Moon's orbit around Earth. Letters *A*, *B*, *C*, and *D* represent four positions in the Moon's orbit.



What is the approximate length of time the Moon takes to travel from position *A* to position *C*?

(1) 1 day
(2) 15 days
(3) 30 days
(4) 365 days

34 The map below shows the average number of thunderstorms each year in the continental United States.



The average number of thunderstorms that occur each year in Albany, New York, is approximately

(1) 15
(2) 25
(3) 35
(4) 45

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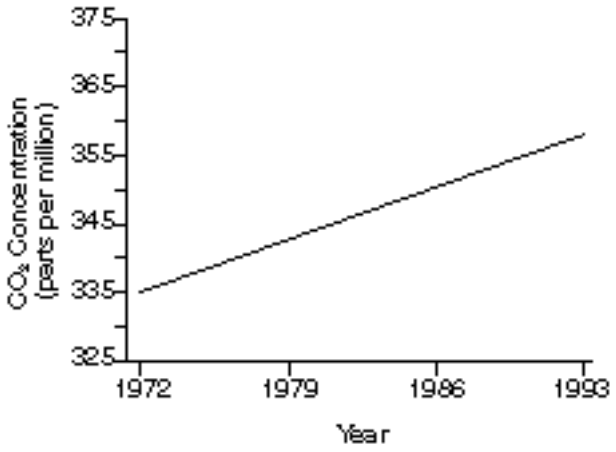
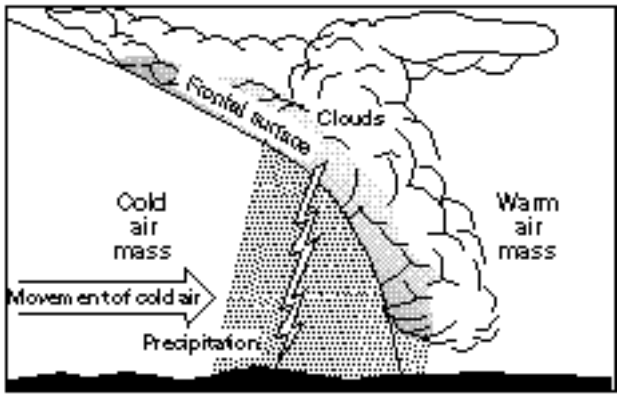
35 The graph below represents the average yearly concentration of carbon dioxide (CO_2) in Earth's atmosphere from 1972 to 1993.



This change in CO_2 concentration most likely caused

1 a decrease in the average wavelength of solar radiation
2 a decrease in the thickness of Earth's atmosphere
3 an increase in the absorption of long-wave heat radiation by Earth's atmosphere
4 an increase in the thickness of Earth's glaciers

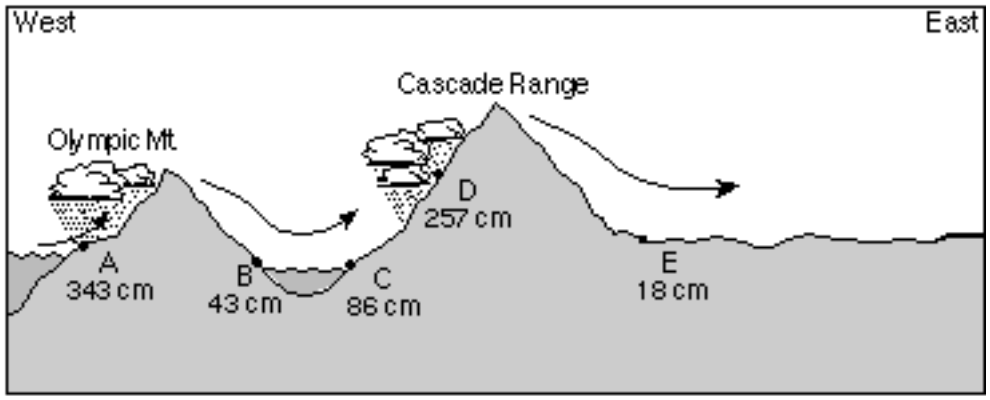
36 The diagram below shows a cross section of a cold front.



The cloud formation and precipitation shown in the cross section are caused by the

1 rising of cold, moist air
2 sinking of cold, moist air
3 rising of warm, moist air
4 sinking of warm, moist air

37 The diagram below shows the average yearly precipitation, in centimeters, at locations *A* through *E* across the State of Washington. Arrows indicate the direction of prevailing winds.

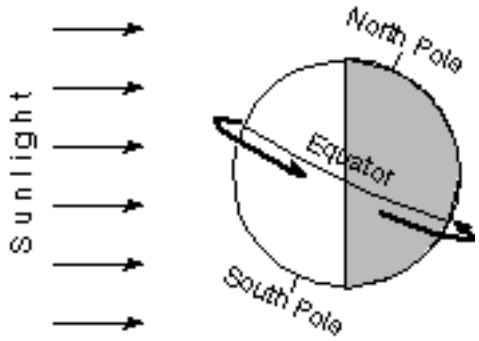


(Not drawn to scale)

Which statement best explains why location *B* and location *E* receive relatively low average yearly precipitation?

1 These locations are on the leeward side of mountain ranges.
2 These locations are on the windward side of mountain ranges.
3 These locations receive more insolation than the other locations.
4 These locations receive less insolation than the other locations.

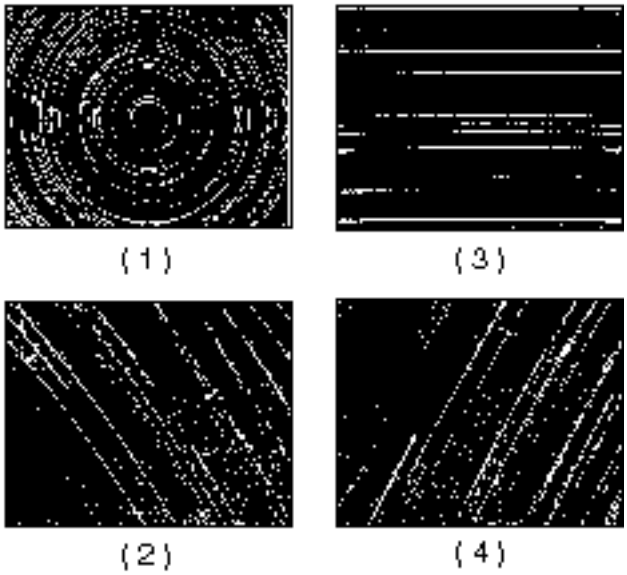
38 The diagram below shows a view of Earth as seen from space at a certain time of the year.



Compared to observers at 35° S latitude, observers at 35° N latitude are generally experiencing

1 fewer hours of daylight and warmer temperatures
2 fewer hours of daylight and cooler temperatures
3 more hours of daylight and warmer temperatures
4 more hours of daylight and cooler temperatures

39 Which photograph of star trails was taken by an observer facing directly north in New York State?



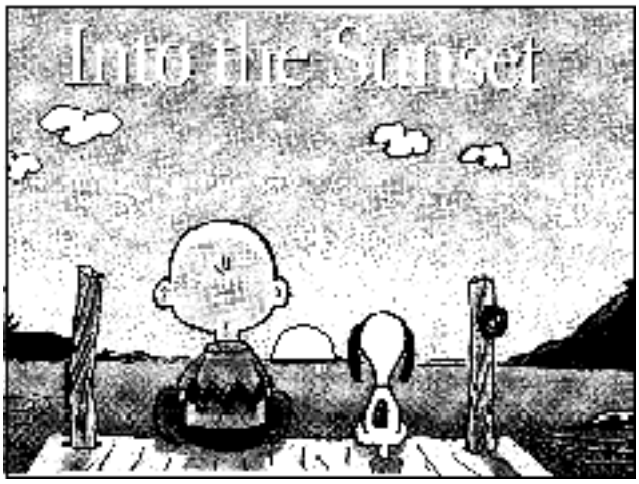
(1)

(3)

(2)

(4)

40 The cartoon characters below are watching the Sun set.



Toward which general direction are the characters looking?

1 north
2 south
3 east
4 west

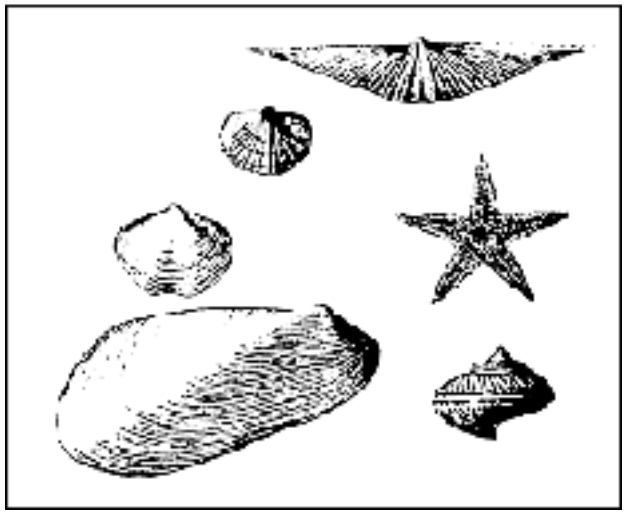
Part II

This part consists of six groups, each containing five questions. Choose any *two* of these six groups. Be sure that you answer all five questions in each of the two groups chosen. Record the answers to these questions on the separate answer paper in accordance with the directions on the front cover of this booklet. Some questions may require the use of the *Earth Science Reference Tables*. [10]

Group A — Rocks and Minerals

If you choose this group, be sure to answer questions 41–45.

41 The diagram below represents the fossils found in a bedrock formation located in central New York State.



In which type of rock were the fossils most likely found?

1 sedimentary rock that formed in an ocean environment
2 sedimentary rock that formed in a land environment
3 igneous rock that formed in an ocean environment
4 igneous rock that formed in a land environment

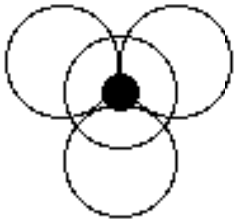
42 How do the metamorphic rocks schist and quartzite differ?

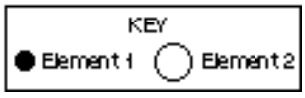
1 Quartzite contains the mineral quartz and schist does not.
2 Quartzite forms from regional metamorphism and schist does not.
3 Schist is organically formed and quartzite is not.
4 Schist is foliated and quartzite is not.

43 The elements contained in four minerals are given in the table below. The basic structural unit of one of the minerals is also shown. The atom of element 1 is surrounded by four atoms of element 2.

Mineral	Element 1	Element 2
Fluorite	calcium	fluorine
Halite	sodium	chlorine
Quartz	silicon	oxygen
Galena	lead	sulfur

Basic Structural Unit





In which mineral are the atoms arranged as shown in the basic structural unit?

1 fluorite
2 halite
3 quartz
4 galena

44 Which natural resource is a source of fuel and plastic?

1 water
2 petroleum
3 coal
4 uranium

45 A mineral's crystal shape and cleavage are a direct result of the mineral's

1 hardness
2 abundance in nature
3 arrangement of atoms
4 exposure to the hydrosphere and atmosphere

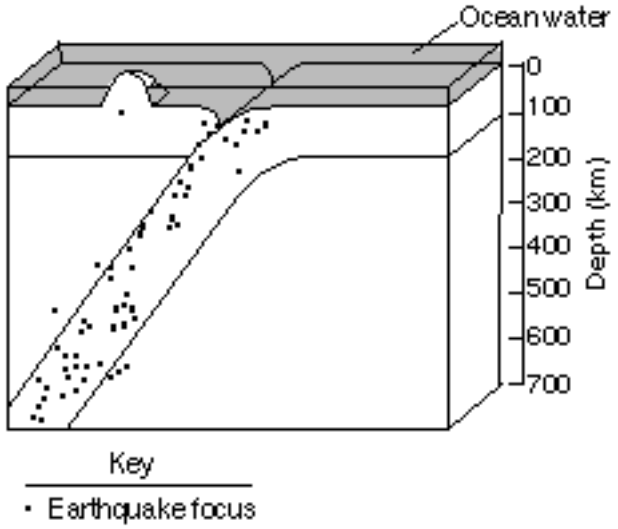
Group B — Plate Tectonics

If you choose this group, be sure to answer questions 46–50.

46 Why is Earth's outer core inferred to be a liquid?

(1) *P*-waves can pass through the outer core.
(2) *P*-waves cannot pass through the outer core.
(3) *S*-waves can pass through the outer core.
(4) *S*-waves cannot pass through the outer core.

47 The cross section below shows the location of earthquakes near a plate boundary.



This distribution of earthquakes near the plate boundary is most likely caused by

1 a transform fault
2 a mantle hot spot
3 subduction of a crustal plate
4 divergence of crustal plates

48 Geologists have used information about the composition of meteorites to make inferences about Earth's

1 core properties
2 atmospheric structure
3 asthenosphere location
4 continental-crust thickness

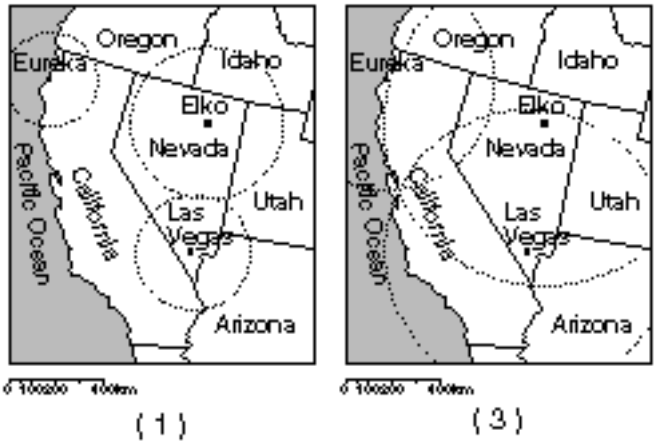
49 The epicenter of an earthquake is located 2,800 kilometers from a seismic station. Approximately how long did the *S*-wave take to travel from the epicenter to the station?

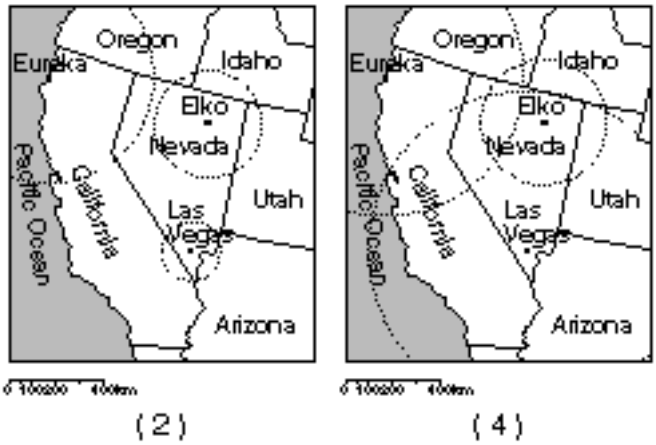
(1) 11 min 15 sec
(2) 9 min 35 sec
(3) 5 min 20 sec
(4) 4 min 20 sec

50 The same earthquake was recorded by seismic stations in Eureka, California; Elko, Nevada; and Las Vegas, Nevada. The distance to the earthquake epicenter for each station is shown below.

Seismic Station Location	Distance to Epicenter
Eureka, CA	485 km
Elko, NV	705 km
Las Vegas, NV	622 km

On which map do the circles correctly show the epicenter distance from each of the seismic stations?





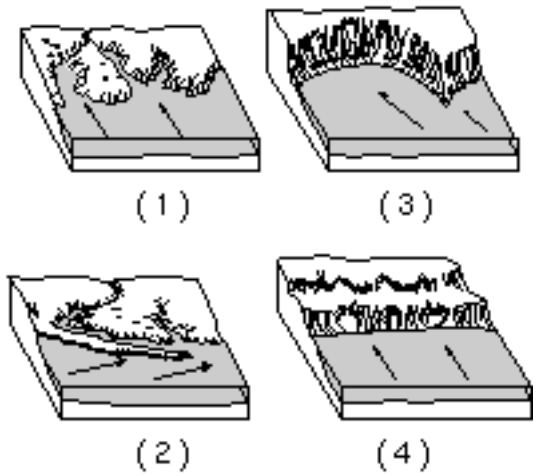
Group C — Oceanography

If you choose this group, be sure to answer questions 51–55.

51 What usually causes tsunamis?

1 hurricanes
2 high-pressure weather systems
3 undersea earthquakes
4 the collision of ocean currents

52 The diagrams below represent landscape features found along the seacoast. The arrows show ocean-wave direction. Which shoreline has been shaped more by deposition than by erosion?



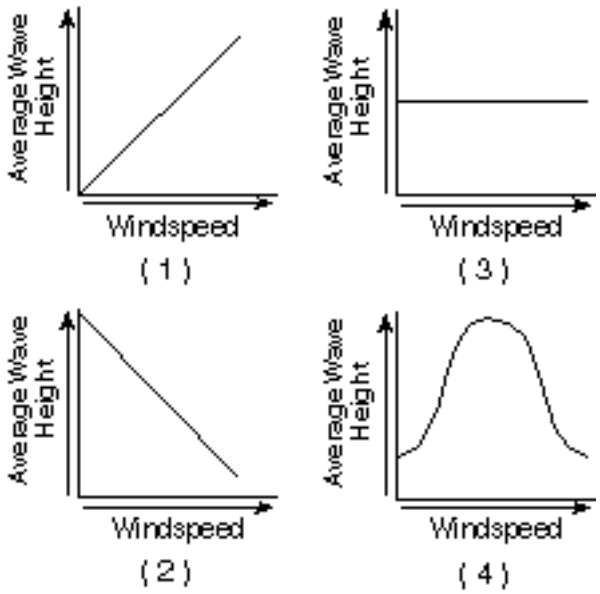
53 Which evidence causes most scientists to believe that seafloor spreading occurs at the mid-Atlantic Ridge?

1 Oceanic crust is oldest at the ridge.
2 Large sedimentary folds exist in the mantle near the ridge.
3 Oceanic crust on both sides of the ridge is less dense than continental crust.
4 Oceanic crust on both sides of the ridge shows matching patterns of reversed and normal magnetic polarity.

54 The curvature to the right by major ocean currents in the Northern Hemisphere is primarily due to

1 surface variations in ocean water salinity
2 differences in ocean water temperatures
3 the gravitational attraction of the Moon
4 the rotation of Earth

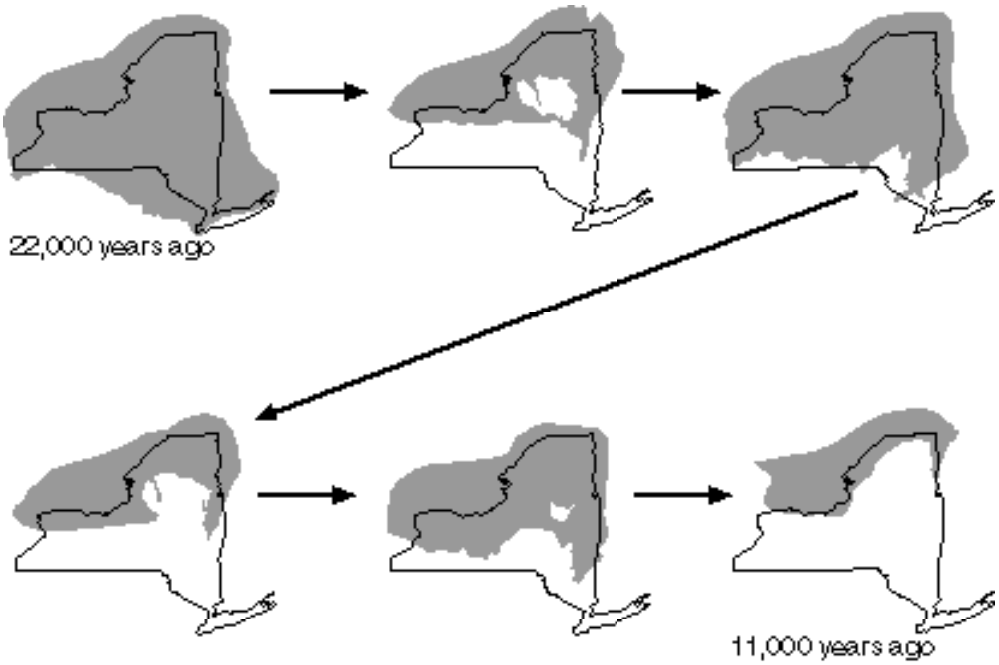
55 Which graph best shows the relationship between windspeed and the average height of ocean waves formed by the wind?



Group D — Glacial Processes

If you choose this group, be sure to answer questions 56–60.

56 Shaded areas on the diagrams below show the part of New York State that was covered by glacial ice during the last ice age.



The best inference that can be made from these diagrams is that this glacial ice

1 was about 1 mile thick at New York City
2 advanced and retreated more than once
3 moved more slowly than the glaciers of earlier ice ages
4 changed the shape of Lake Ontario

57 What is the best evidence that a glacial erratic has been transported?

1 It is located at a high elevation in a mountainous area.
2 It is less than 25 centimeters in diameter.
3 Its composition is different from that of the bedrock under it.
4 It appears to have been intensely metamorphosed.

58 Which New York State resources are a direct result of the glaciers that once covered most of the State?

1 sand and gravel
2 halite and gypsum
3 magnetite and calcite
4 limestone and marble

59 Which condition causes glaciers to retreat?

1 They encounter the ocean.
2 The crust beneath them is uplifted.
3 Earth's average temperature decreases.
4 Their rate of melting exceeds their rate of advancing.

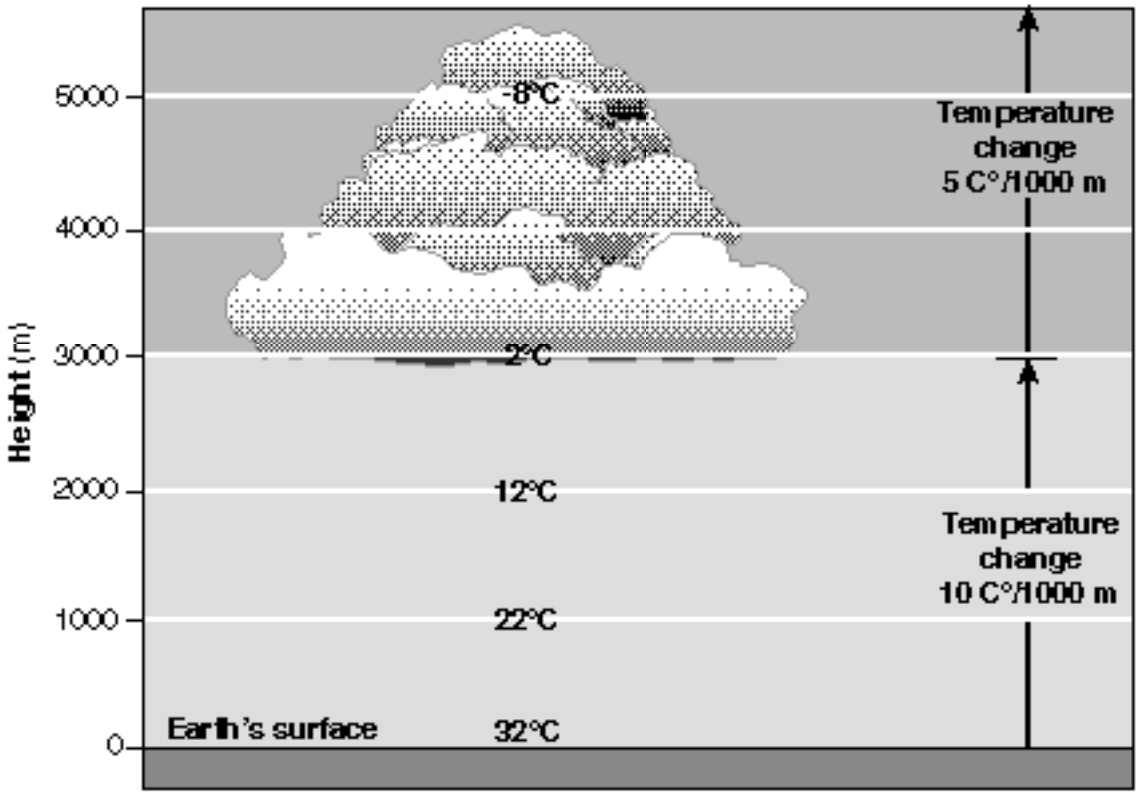
60 Which statement provides the best evidence that New York State's Finger Lakes formed as a result of continental glaciation?

1 The lake surfaces are above sea level.
2 The lakes fill long, narrow U-shaped valleys.
3 The lakes are partially filled with sorted beds of sediment.
4 The lakes are surrounded by sharp, jagged peaks and ridges.

Group E — Atmospheric Energy

If you choose this group, be sure to answer questions 61–65.

Base your answers to questions 61 and 62 on the diagram below, which shows temperature changes within a parcel of air on a summer day.



61 At 4,000 meters above Earth's surface, the temperature within the cloud is approximately

(1) –12°C
(2) –3°C
(3) 3°C
(4) 0°C

62 Which process slows the rate of cooling above 3,000 meters and results in cloud formation?

1 condensation
2 evaporation
3 convection
4 radiation

63 What is the latent heat of vaporization of water?

(1) 1.0 cal/g•C°
(2) 0.5 cal/g•C°
(3) 80.0 cal/g
(4) 540.0 cal/g

64 Which weather instrument has most improved the accuracy of weather forecasts over the past 40 years?

1 thermometer
2 sling psychrometer
3 weather satellite
4 weather balloon

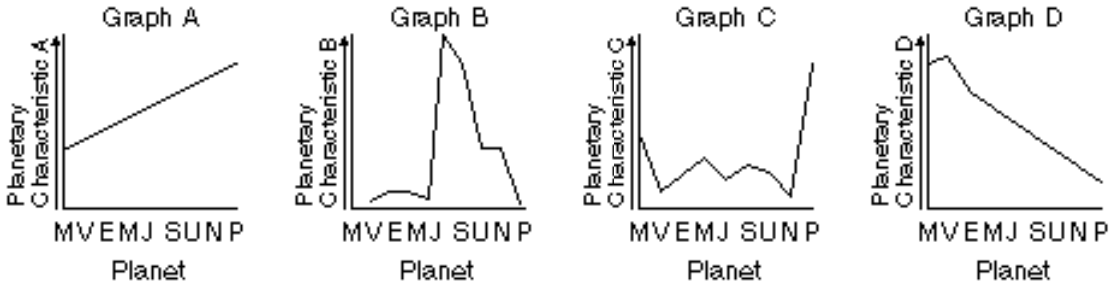
65 Which form of electromagnetic radiation has a wavelength of 10^{-7} meter?

1 gamma rays
2 ultraviolet
3 infrared
4 radio waves

Group F — Astronomy

If you choose this group, be sure to answer questions 66–70.

Base your answers to questions 66 and 67 on the four graphs below, which represent trends for four characteristics of the planets in Earth's solar system. The planets are indicated in order of increasing distance from the Sun.



66 Which graph best illustrates the surface temperatures of the planets?

(1) *A* (3) *C*
(2) *B* (4) *D*

67 Which graph best represents the amount of time it takes each planet to orbit the Sun once?

(1) *A* (3) *C*
(2) *B* (4) *D*

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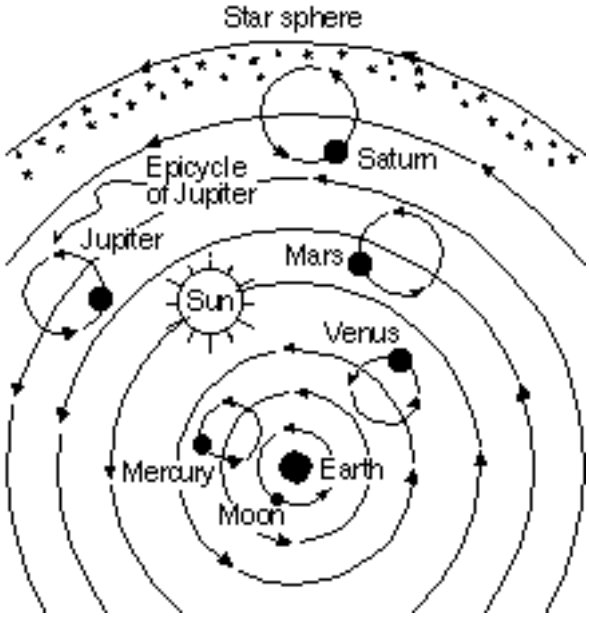
68 The diagram below shows one model of a portion of the universe.



What type of model does the diagram best demonstrate?

1 a heliocentric model, in which celestial objects orbit Earth
2 a heliocentric model, in which celestial objects orbit the Sun
3 a geocentric model, in which celestial objects orbit Earth
4 a geocentric model, in which celestial objects orbit the Sun

69 The apparent change in direction of a Foucault pendulum is caused by

1 star motions
2 Earth's rotation
3 the Moon's gravitational attraction
4 density differences within the mantle

70 Based on the red-shift data on galaxies, most astronomers infer that the universe is currently

1 expanding
2 contracting
3 moving randomly
4 fixed and stationary

Part III

This part consists of questions 71 through 88. Be sure that you answer *all* questions in this part. Record your answers in the spaces provided on the separate answer paper. You may use pen or pencil. Some questions may require the use of the *Earth Science Reference Tables*. [25]

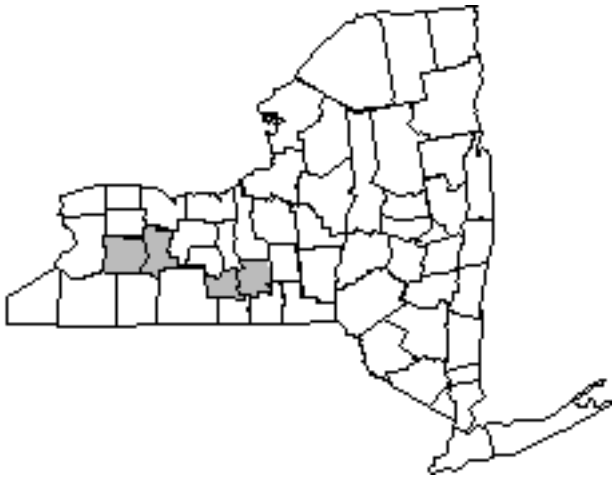
Base your answers to questions 71 and 72 on the data table below, which shows the percent and uses of different types of salt in the United States.

Uses of Salt in the United States

Salt Usage	Percent	How Used
Water softening	9	Sodium ions from salt replace calcium and magnesium ions in water.
Highways	69	Salt keeps highways free of ice in the winter.
Agriculture	6	Salt is provided for livestock and poultry to balance their diet.
Foods	5	Humans use salt in their diet.
Industry	11	Many industrial processes, such as paper-making, use salt.

71 On the pie graph provided *on your answer paper*, complete the graph to show the percent of *each* salt usage. (The percent of salt used in industry has been drawn and labeled.) Label *each* section of the pie graph to indicate the salt usage. [2]

72 Shaded areas on the map below represent some counties in New York State where salt is mined.



State the name of *one* New York State landscape region in which all or part of these counties are located. [1]

_____

Base your answers to questions 73 through 75 on the information and data table below.

In August 1992, Hurricane Andrew, the most costly natural disaster in United States history, hit southern Florida. The data table below shows the location and classification of Hurricane Andrew on 7 days in August 1992.

Data Table

Day	Latitude	Longitude	Storm Classification
August 18	13° N	46° W	Tropical storm
August 20	19° N	59° W	Tropical storm
August 22	25° N	66° W	Hurricane
August 24	25° N	78° W	Hurricane
August 26	28° N	90° W	Hurricane
August 27	32° N	91° W	Tropical storm
August 28	34° N	86° W	Tropical storm

73 On the hurricane tracking map provided *on your answer paper,* plot the locations of Hurricane Andrew given in the data table, following the directions below.

a Use an **X** to mark *each* location on the grid. [1]

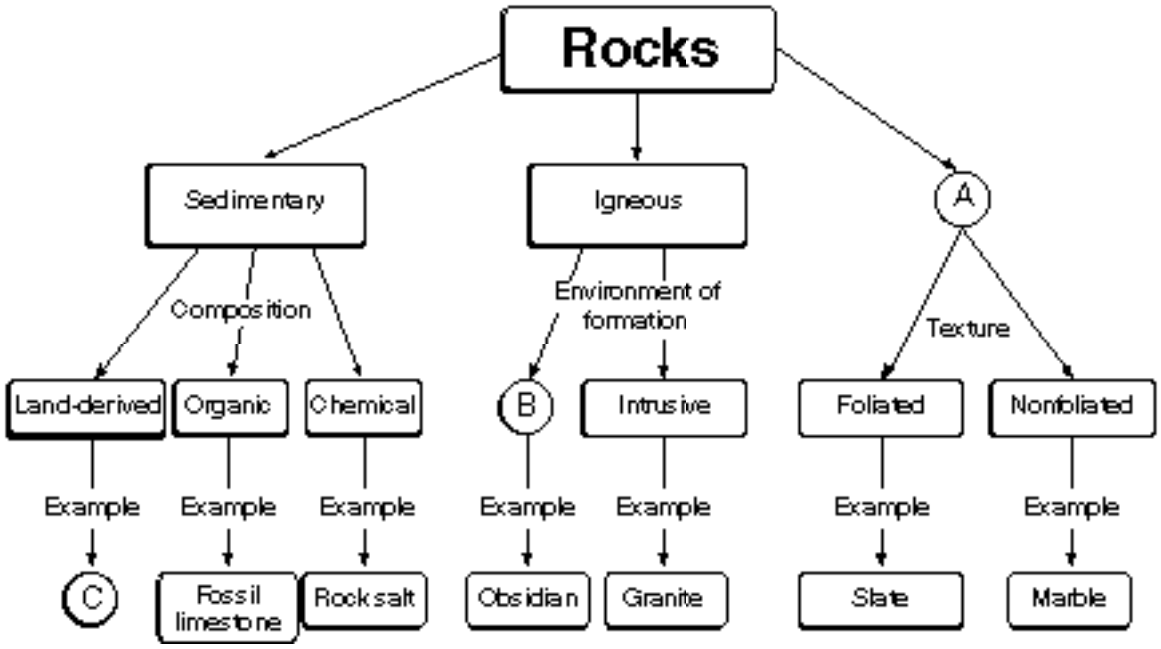
b Label *each* **X** with the appropriate date. The data for August 18 has been plotted on your answer paper as an example. [1]

c Connect the **X**'s with a line to show the hurricane's path. [1]

74 As Hurricane Andrew approached Miami, Florida, cloudiness and precipitation increased dramatically. State how the air pressure at Miami was changing at this time. [1]

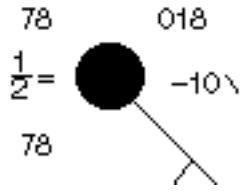
75 By August 27, Hurricane Andrew was downgraded from a hurricane to a tropical storm because its windspeed decreased. State *one* reason why Hurricane Andrew's windspeed decreased at this time. [1]

76 The chart below shows the different rock families and their subdivisions. The circled letters, *A*, *B*, and *C*, indicate parts of the chart that have not been completed.



Complete the chart by writing the missing terms in the spaces labeled *A*, *B*, and *C on your answer paper.* [3]

Base your answers to questions 77 and 78 on the weather station model shown below.



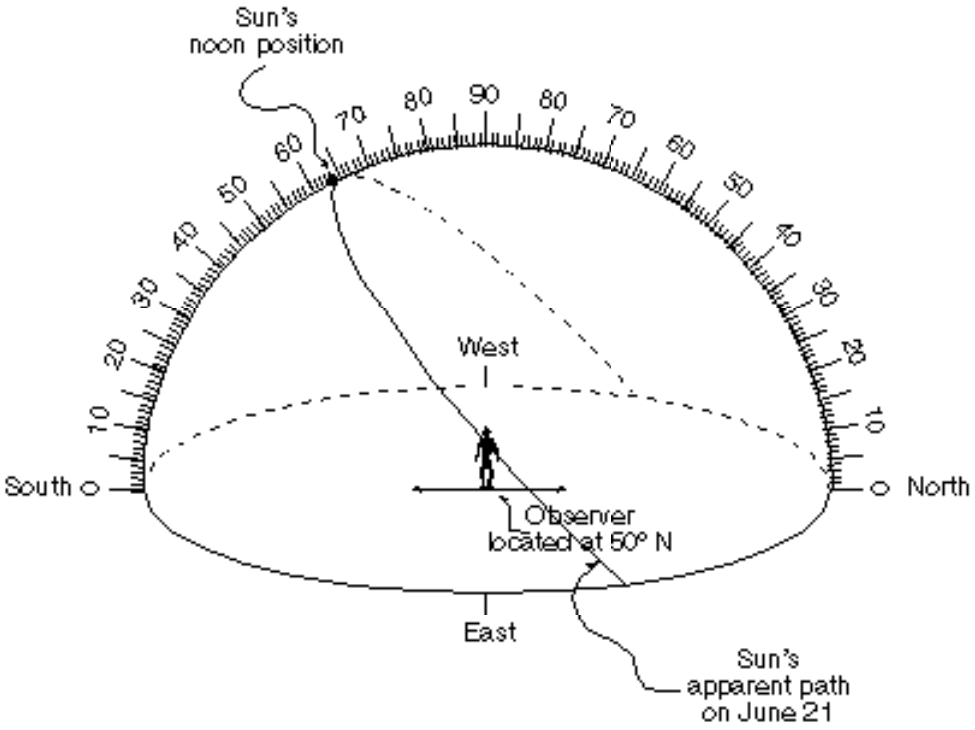
77 State the condition represented by the symbol for "present weather." [1]

78 State the relative humidity. [1]

---

79 The group of stars known as the Big Dipper can be used to locate the North Star (Polaris) in the night sky. On the diagram of the Big Dipper provided *on your answer paper,* draw a straight arrow passing through *two* stars to indicate the direction to Polaris. [1]

Base your answers to questions 80 through 82 on the diagram below. The diagram is a model of the sky (celestial sphere) for an observer at 50° N latitude. The Sun's apparent path on June 21 is shown.



80 On the diagram provided *on your answer paper,* mark with a dot the position of Polaris as viewed by the observer. Label this dot "Polaris." [1]

81 On the diagram provided *on your answer paper,* mark with a dot the position of the observer's zenith. Label this dot "Zenith." [1]

82 The altitude of the Sun's position at noon on March 21 is 40° at this location. On the diagram provided *on your answer paper,* draw and label the approximate apparent path of the Sun on March 21. [1]

---

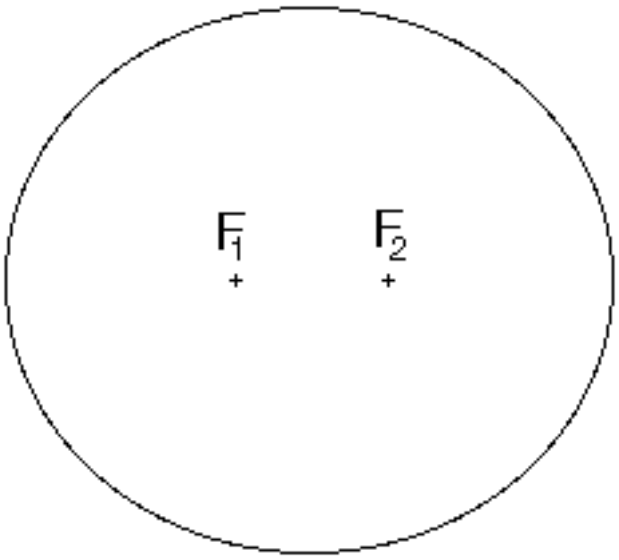
83 Below is a list of some mineral resources and the number of years that supplies are estimated to last (supply time) if use continues at the current rate.

Mineral Resources' Future

Mineral Resource	Estimated Supply Time
Salt, magnesium metal	almost infinite
Lime, silicon	thousands of years
Potash, cobalt	200+ years
Manganese ore	200+ years
Iron ore	100 to 200 years
Chromite, feldspar	100 to 200 years
Bauxite (aluminum ore)	50 to 100 years
Phosphate rock, nickel	50 to 100 years
Copper, mercury	less than 50 years
Zinc, lead	less than 50 years

State *one* way humans could increase the estimated supply time for many of these resources. [1]

Base your answers to questions 84 and 85 on the diagram of an ellipse below.



84 Calculate the eccentricity of the ellipse, following the directions below.

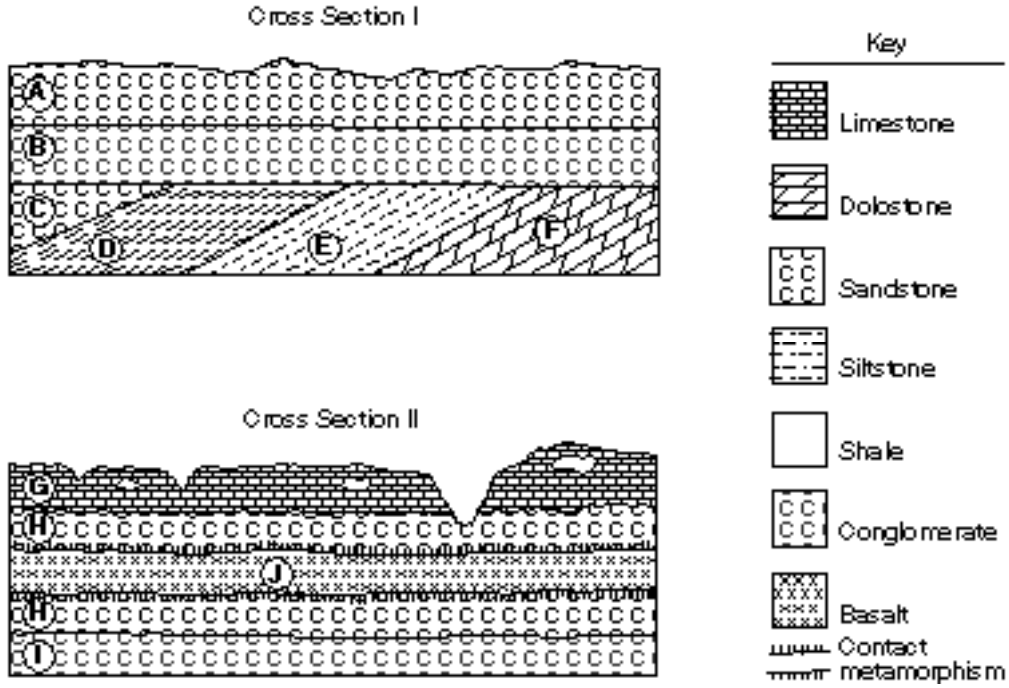
a Write the equation used to determine eccentricity. [1]

b Based on measurements of the diagram, substitute values into the equation. [1]

c Calculate the eccentricity of the ellipse. [1]

85 State how the eccentricity of the given ellipse compares to the eccentricity of Earth's orbit. [1]

Base your answers to questions 86 through 88 on cross sections I and II shown below. Letters *A* through *J* represent rock units. Rock units *B* and *I* are the same age. Overturning has not occurred in either cross section.



86 State the letter of the oldest rock unit shown in the cross sections. [1]

87 State the name of a metamorphic rock that would be found in the zone of contact metamorphism surrounding rock unit *J*. [1]

88 A buried erosional surface (unconformity) exists in cross section I. Identify the position of the most apparent unconformity by drawing a thick wavy line (~~~) at the correct position in cross section I *on your answer paper*. [1]

Part II (35 credits)

Answer the questions in only seven of the ten groups in this part. Be sure to mark the answers to the groups of questions you choose in accordance with the instructions on the front cover of the test booklet. Leave blank the three groups of questions you do not choose to answer.

Tear Here

Group 1				
56	1	2	3	4
57	1	2	3	4
58	1	2	3	4
59	1	2	3	4
60	1	2	3	4

Group 2				
61	1	2	3	4
62	1	2	3	4
63	1	2	3	4
64	1	2	3	4
65	1	2	3	4

Group 3				
66	1	2	3	4
67	1	2	3	4
68	1	2	3	4
69	1	2	3	4
70	1	2	3	

Group 4				
71	1	2	3	4
72	1	2	3	4
73	1	2	3	4
74	1	2	3	4
75	1	2	3	4

Group 5				
76	1	2	3	4
77	1	2	3	4
78	1	2	3	4
79	1	2	3	4
80	1	2	3	4

Group 6				
81	1	2	3	4
82	1	2	3	4
83	1	2	3	4
84	1	2	3	4
85	1	2	3	4

Group 7				
86	1	2	3	4
87	1	2	3	4
88	1	2	3	4
89	1	2	3	4
90	1	2	3	4

Group 8				
91	1	2	3	4
92	1	2	3	4
93	1	2	3	4
94	1	2	3	4
95	1	2	3	4

Group 9				
96	1	2	3	4
97	1	2	3	4
98	1	2	3	4
99	1	2	3	4
100	1	2	3	4

Group 10				
101	1	2	3	4
102	1	2	3	4
103	1	2	3	4
104	1	2	3	4
105	1	2	3	

Tear Here

I do hereby affirm, at the close of this examination, that I had no unlawful knowledge of the questions or answers prior to the examination and that I have neither given nor received assistance in answering any of the questions during the examination.

Signature

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

EARTH SCIENCE

Thursday, June 15, 2000 – 9:15 a.m. to 12:15 p.m., only

ANSWER SHEET

Part I Credits	.....
Part II Credits	.....
Performance Test Credits . .	.....
Total (Official Regents) Examination Mark	.....
Reviewer's Initials:	_____

Student . . . . . Sex: ☐ Male ☐ Female

Teacher . . . . . School . . . . . .

Grade (circle one) 8 9 10 11 12

Record all of your answers on this answer sheet in accordance with the instructions on the front cover of the test booklet.

Part I (55 credits)

1	1	2	3	4	**16**	1	2	3	4	**31**	1	2	3	4	**46**	1	2	3	4
2	1	2	3	4	**17**	1	2	3	4	**32**	1	2	3	4	**47**	1	2	3	4
3	1	2	3	4	**18**	1	2	3	4	**33**	1	2	3	4	**48**	1	2	3	4
4	1	2	3	4	**19**	1	2	3	4	**34**	1	2	3	4	**49**	1	2	3	4
5	1	2	3	4	**20**	1	2	3	4	**35**	1	2	3	4	**50**	1	2	3	4
6	1	2	3	4	**21**	1	2	3	4	**36**	1	2	3	4	**51**	1	2	3	4
7	1	2	3	4	**22**	1	2	3	4	**37**	1	2	3	4	**52**	1	2	3	4
8	1	2	3	4	**23**	1	2	3	4	**38**	1	2	3	4	**53**	1	2	3	4
9	1	2	3	4	**24**	1	2	3	4	**39**	1	2	3	4	**54**	1	2	3	4
10	1	2	3	4	**25**	1	2	3	4	**40**	1	2	3	4	**55**	1	2	3	
11	1	2	3	4	**26**	1	2	3	4	**41**	1	2	3	4					
12	1	2	3	4	**27**	1	2	3	4	**42**	1	2	3	4					
13	1	2	3	4	**28**	1	2	3	4	**43**	1	2	3	4					
14	1	2	3	4	**29**	1	2	3	4	**44**	1	2	3	4					
15	1	2	3	4	**30**	1	2	3	4	**45**	1	2	3	4					

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